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BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

BOB BURNS – Chairman
BOYD DUNN
SANDRA KENNEDY
JUSTIN OLSON
LEA MÁRQUEZ PETERSON

IN THE MATTER OF THE APPLICATION
OF ARIZONA PUBLIC SERVICE COMPANY
FOR A HEARING TO DETERMINE THE FAIR
VALUE OF THE UTILITY PROPERTY OF
THE COMPANY FOR RATEMAKING
PURPOSES, TO FIX A JUST AND
REASONABLE RATE OF RETURN
THEREON, TO APPROVE RATE SCHEDULES
DESIGNED TO DEVELOP SUCH RETURN.

Docket No. E-01345A-19-0236

**SIERRA CLUB'S NOTICE OF
ERRATA**

Sierra Club provides this notice of errata to Tyler Coming's Direct Testimony, which was filed on October 2, 2020. In order to reduce the amount of confidential information referenced in this testimony, Sierra Club has consulted with Arizona Public Service ("APS") regarding making public some of the results from Mr. Comings' analysis. The Company has agreed that these results may be made public. The attached includes the impacted pages, which have been updated to remove redaction from Mr. Comings' now-public results. Sierra Club will be separately providing updated copies of the confidential and highly confidential versions of the impacted pages to the Commission and to APS for distribution to parties who have signed the protective agreement. The confidential and highly confidential changes also remove a duplicative paragraph on page 35, lines 1-3, which was mistakenly included in the Highly Confidential original.

1
2 RESPECTFULLY SUBMITTED this 4th day of December, 2020.
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By: /s/ Miriam Raffel-Smith

1 [REDACTED] while the costs of
2 competing resources have decreased. Renewable and storage resource costs
3 have dropped dramatically and are widely expected to continue to decline.
4 Gas prices have remained low, and industry-wide forecasts of future gas
5 prices have decreased dramatically. Despite these trends, since APS acquired
6 its current share in 2013, the Company has failed to evaluate retiring and
7 replacing Four Corners Units 4 and 5 before 2031.

8 **2. I found that the units are too costly to justify continued operation;**
9 **therefore, I recommend that they be retired as soon as possible. I**
10 conducted a forward-looking economic assessment of these units—
11 comparing a 2023 retirement to the Company’s currently planned 2031
12 retirement. Relying on the Company’s projected costs of the two units
13 through 2031 (including in its 2020 IRP), I find that there would be substantial
14 savings from early retirement across a wide range of assumptions. For
15 instance, using the Company’s 2020 IRP base case scenario, I estimate
16 savings between \$775 million and \$1.54 billion. Importantly, these savings
17 would occur even if the costs of past expenditures (such as the selective
18 catalytic reduction or “SCR”) were allowed into rates. I also accounted for
19 differences in termination costs between the two retirement years—including
20 those at the Navajo Mine. With these substantial savings, the Company
21 should plan to retire the units as soon as possible, issue a competitive
22 solicitation for a wide and robust sample of replacement options, and plan for
23 a just and equitable transition for the affected communities.

1 investment in the units under a 2031 retirement, and asking for recovery of these
2 costs from ratepayers.

3 **III. FOUR CORNERS UNITS 4 AND 5 WILL CONTINUE TO COST RATEPAYERS**
4 **SUBSTANTIALLY AND SHOULD BE RETIRED AS SOON AS POSSIBLE**

5 **Q. Please summarize your assessment of the going forward costs of Four Corners**
6 **Units 4 and 5.**

7 A. In this section, I explain my forward-looking economic assessment of the units,
8 comparing retiring units 4 and 5 by the end of 2023 to the Company's current plan to
9 retire them in 2031. I used forecasts APS provided in March 2020 and the Company's
10 recently released 2020 IRP. Under a wide range of assumptions, I find that early
11 retirement of the units would provide substantial savings to ratepayers. For instance,
12 using the Company's 2020 IRP base case, I estimated savings between \$775 million
13 and \$1.54 billion. This assessment relied on the Company's projections of the units'
14 fixed and variable costs, as well as costs associated with ending their operations—
15 such as any costs related to termination of the coal contract with the Navajo mine.

16 Given these results, APS should plan for the early retirement of these units and the
17 Commission should consider my findings before allowing further expenditures at
18 these units into rates, absent specific justifications for individual expenditures. If
19 APS does not agree to retire the units in 2023, the Commission should require that
20 the Company amend its 2020 IRP to include an evaluation of 2023 retirement (or a
21 retirement as soon thereafter as possible). As noted, I may provide additional
22 testimony on this topic following APS's response to Chairman Burns' September 1,
23 2020 letter.

1 skew high compared to all-source RFP bids received by nearby utilities for coal
2 replacement (as discussed previously) in recent years. Nevertheless, I also
3 calculated a “breakeven” replacement cost at which 2023 and 2031 retirement
4 would be equal. If APS were to procure replacement resources (including a
5 portfolio of replacement resources) at any cost below this “breakeven” level, a 2023
6 retirement and replacement would provide savings compared to operation through
7 2031.

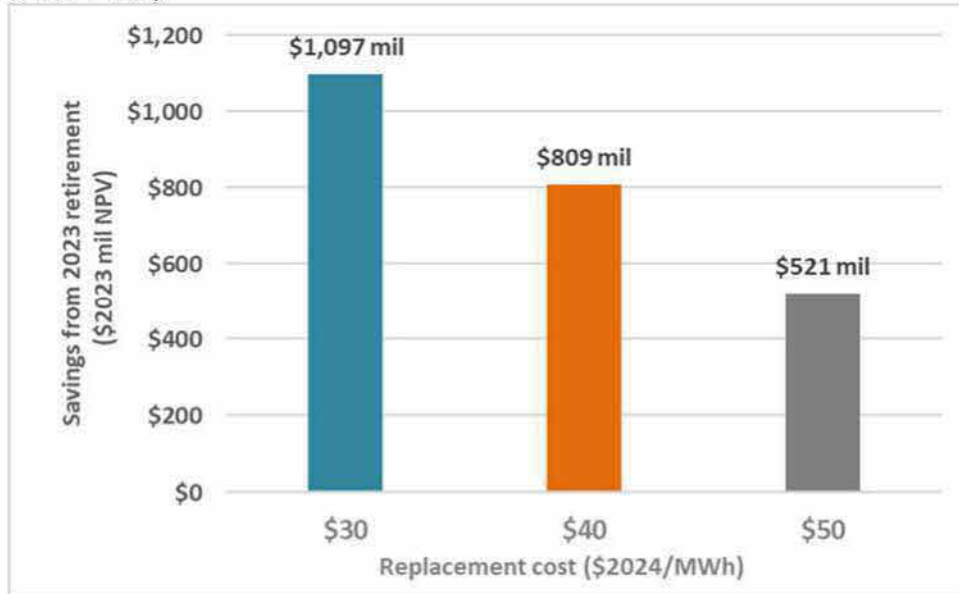
8 **Q. What are your findings regarding early retirement and replacement of Four**
9 **Corners Units 4 and 5 based on the forecasts APS provided in March 2020?**

10 A. My findings demonstrate APS’s customers would save money if Four Corners
11 retired in 2023 rather than 2031. I estimate that the savings are substantial, using
12 low, mid, and high replacement costs of \$30, \$40, and \$50 per MWh (respectively).
13 Here, I relied on forecasts that APS provided to Sierra Club in March 2020 and
14 produced “between the third quarter of 2016 and the third quarter of 2019.”⁷⁹ The
15 results, shown in Figure 5, include:

- 16 • At low replacement costs of \$30 per MWh, the savings from 2023
17 retirement are nearly \$1.1 billion NPV (2024 through 2031)
- 18 • At mid replacement costs of \$40 per MWh, the savings from 2023 are \$809
19 million NPV (2024 through 2031)
- 20 • At high replacement costs of \$50 per MWh, the savings from 2023 are over
21 \$521 million NPV (2024 through 2031)

⁷⁹ Attach. TC-2, APS Response to SC DR 6.1(a).

Figure 5: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5 (\$2023 NPV mil)⁸⁰



Q. Would customer savings occur immediately after 2023 retirement?

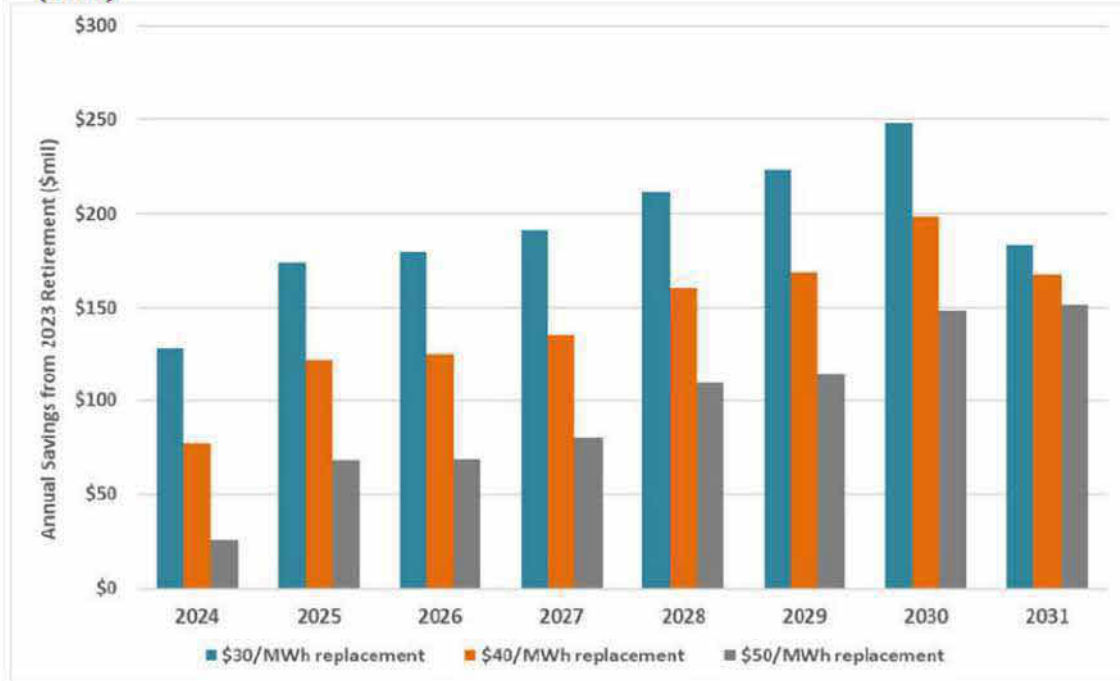
A. Yes, if the Company procured PPA replacements in this \$30-\$50 per MWh range, then the savings would be immediate. In 2024, the annual savings would range from \$25.8 to \$127.1 million—shown in Figure 6—and the annual savings would escalate through 2030. Savings in 2031 are lower because APS assumes that the

⁸¹

⁸⁰ See *supra* note 71; Attach. TC-3, Confidential Attachment “SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF” (referred to in APS Response to SC DR 2.3(d)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, Attachment “SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs” (referred to in APS Supplemental Response to SC DR 2.3(f)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, APS Response to SC DR 6.4(b).

⁸¹ Attach. TC-4, Highly Confidential Attachment “SC 1.16_ExcelAPS19RC00885_Unit ALL_Highly CONF” (referred to in APS Supplemental Response to SC DR 1.16).

Figure 6: Annual Savings from 2023 Retirement of Four Corners 4 and 5 (\$mil)⁸²



Q. What is the “breakeven” replacement cost at which the costs of 2023 and 2031 retirement would be the same?

A. A replacement cost of \$68.12 per MWh in 2024 (escalating at 2 percent annually) would be a “break even” point. Replacement costs below this level would produce savings from earlier retirement.

Q. Is it possible your analysis above actually underestimated savings?

A. Yes. Several of my assumptions were deliberately conservative (i.e., favorable to a 2031 retirement), including:

- The forecasts of variable costs from APS did not include [REDACTED]
- The addition of [REDACTED] would increase the units’ costs and thus increase savings from their retirement.

⁸² See *supra* note 80.

- 1 • I assumed the units would operate through December of 2023, but if it
2 were feasible to retire the units earlier then there would be additional
3 savings in 2023 that are not currently captured.
- 4 • I assumed APS would incur the same capital costs through 2023
5 whether the units retire at the end of that year or in 2031. But if APS
6 planned for 2023 retirement, it is likely capital spending leading up to
7 that date could be avoided. Savings from these avoided costs were not
8 included in my analysis.
- 9 • I assumed that the units would operate at the level projected by APS. In
10 the event that the units generated less energy—which could result from
11 a variety of factors like lower-than-forecasted customer load, higher
12 forced outages, carbon costs, or lower-than-anticipated gas prices—
13 then the savings would be higher because there would be less
14 replacement energy needed.

15 **Q. Did you also conduct a forward-looking assessment using the Company’s 2020**
16 **IRP modeling?**

17 A. Yes. The analysis above was based on the information the Company provided for
18 the most recent forecasts of Four Corners costs at the time of the data request.⁸³ The
19 Company provided the data in early March 2020. Subsequently, the Company filed
20 its 2020 IRP on June 26, 2020. As a check against the savings estimates above, I
21 also evaluated retirement of the two units using the Company’s 2020 IRP forecasts.

⁸³ See *supra* note 70.

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1 **Q. Did the analysis of the Company’s 2020 IRP modeling change your conclusions**
2 **about Four Corners Units 4 and 5?**

3 A. No. The IRP analysis reinforced my conclusion that the units should be retired. In
4 the 2020 IRP, the Company modeled three carbon cost sensitivities starting in 2025:
5 high, base, and no carbon cost.⁸⁴ It also modeled three portfolios that represented
6 the approach to moving towards clean energy: Bridge, Shift, and Accelerate. In all
7 three portfolios, Four Corners operates through 2031.⁸⁵ I used the Company’s
8 forecasts for the Bridge portfolio under its three carbon cost sensitivities.⁸⁶ The
9 treatment of avoidable, unavoidable, and incremental costs remains consistent with
10 what I described above.

11 The resulting savings from 2023 retirement of Four Corners 4 and 5 are shown
12 below in Table 1. In the Bridge portfolio under the Company’s 2020 IRP base case
13 scenario, the savings from retiring the units by end-of-year 2023 was between \$775
14 million and \$1.36 billion, more than \$250 million higher than the savings I had
15 estimated using the March 2020 forecasts provided in this proceeding. In addition
16 to this “base case,” which incorporated a base carbon cost, APS’s 2020 IRP also
17 evaluated “high carbon” and “no carbon” cases. Not surprisingly, a higher carbon
18 cost would lead to higher retirement savings and, conversely, a lower carbon cost
19 would lead to lower savings. The “breakeven” replacement cost using the 2020 IRP

⁸⁴ 2020 IRP at 147.

⁸⁵ *Id.* at 18.

⁸⁶ The Company did not choose a preferred portfolio. I chose the Bridge portfolio to be conservative (favorable to Four Corners operating through 2031), as it had the lowest amount of carbon reduction of the three portfolios. [REDACTED]
[REDACTED]

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is between \$61.5 and \$78.2 per MWh. The average savings across the nine 2020 IRP combinations of replacement costs and carbon costs is \$944 million.

Table 1: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5 (\$2023 NPV mil)⁸⁷

	2020 IRP Bridge (high carbon)	2020 IRP Bridge (base carbon)	2020 IRP Bridge (no carbon)	APS March 2020 (no carbon)
Savings with \$30/MWh replacement (\$mil)	\$1,423	\$1,364	\$929	\$1,097
Savings with \$40/MWh replacement (\$mil)	\$1,128	\$1,069	\$634	\$809
Savings with \$50/MWh replacement (\$mil)	\$833	\$775	\$339	\$521
<i>Breakeven replacement cost (\$/MWh)</i>	\$78.2	\$76.3	\$61.5	\$68.1

Q. Is it likely that the 2020 IRP savings estimates are too low?

A. Yes. The forecasts of fixed O&M for the two units are [REDACTED] in the 2020 IRP, compared to past IRPs and the forecasts provided in this case in March 2020.

⁸⁷ I relied on the following spreadsheets in my analysis: Highly Confidential Attachment “2.12_ExcelAPS19RC01442_Bridge-Base Output files_HIGHLY CONF” (referred to in APS Response to Citizen Groups DR 2.12); Highly Confidential Attachment “2.12_ExcelAPS19RC01743_APS 2020 IRP Carbon Sensitivity Bridge-High Carbon_HIGHLY CONF” (referred to in APS Response to Citizen Groups DR 2.12); Highly Confidential Attachment “2.12_ExcelAPS19RC01744_APS 2020 IRP Carbon Sensitivity Bridge-Low Carbon_HIGHLY CONF” (referred to in APS Response to Citizen Groups DR 2.12) (Sierra Club will not be providing the 2.12 attachments due to the confidential nature and volume of the documents. The spreadsheets are available on the case Sharepoint site pursuant with the protective agreement.); Attach. TC-4, Highly Confidential Attachment “Citizen Groups 2.14_ExcelAPS19RC01446_FC CAPEX_HIGHLY CONF” (referred to in APS Response to Citizen Groups DR 2.14); Attach. TC-3, Confidential Attachment “SC 6.4_ExcelAPS19RC01807_Bridge_Base_CONF” (referred to in APS Response to Sierra Club DR 6.4); Attach. TC-2, APS response to SC DR 6.4(b); Attach. TC-3, Confidential Attachment “SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF” (referred to in APS Response to SC DR 2.3(d)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, Attachment “SC

Figure 7 shows the Company's various forecasts of fixed O&M. This shows that the March 2020 forecast is [REDACTED] with forecasts in the previous three IRPs (2012, 2014 and 2017) yet the 2020 IRP forecast is [REDACTED]

Figure 7: Four Corners Units 4 and 5 Fixed O&M (\$mil) HIGHLY CONFIDENTIAL⁸⁸



2.3_ExcelAPS19RC01224_Sellers Stranded Costs" (referred to in APS Response to SC DR 2.3(f)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4).

⁸⁸ Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01244_12IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "2.1_ExcelAPS19RC01247_14IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01250_17IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "SC 6.4_ExcelAPS19RC01807_Bridge_Base_CONF" (provided as an attachment to APS Response to SC DR 6.4); Attach. TC-4, Highly Confidential Attachment "SC 2.5_ExcelAPS19RC01226_Fixed Fuel and O&M Costs_HIGHLY CONF" (referred to in APS Response to SC DR 2.5(a)).

1 **Q. Did you conduct a sensitivity analysis of the 2020 IRP savings estimates using**
2 **fixed O&M from March 2020?**

3 A. Yes. Substituting the March 2020 fixed O&M, which is [REDACTED] with past IRP
4 forecasts, the retirement savings estimates using the 2020 IRP forecasts would
5 increase by \$174 million across the board. The IRP results, updated with the March
6 2020 fixed O&M estimate, are shown below in Table 2. After this substitution, my
7 original savings estimates (using all March 2020 forecasts) and the 2020 IRP, no
8 carbon sensitivity are similar. These savings estimates range from \$514 million to
9 \$1.6 billion. And as noted above, the savings increase with increasing carbon cost
10 assumptions in the base case and high carbon cases. Using the Company's 2020
11 IRP base case and comparing across the results in Tables 1 and 2, I estimate savings
12 between \$775 million (with the \$50/MWh replacement and 2020 IRP fixed O&M)
13 and \$1.54 billion (with the \$30/MWh replacement and March 2020 fixed O&M).

Table 2: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5, using APS March 2020 Fixed O&M Forecast (\$2023 NPV mil)⁸⁹

	2020 IRP Bridge (high carbon)	2020 IRP Bridge (base carbon)	2020 IRP Bridge (no carbon)	APS March 2020 (no carbon)
Savings with \$30/MWh replacement (\$mil)	\$1,597	\$1,539	\$1,104	\$1,097
Savings with \$40/MWh replacement (\$mil)	\$1,302	\$1,244	\$809	\$809
Savings with \$50/MWh replacement (\$mil)	\$1,007	\$949	\$514	\$521
<i>Breakeven replacement cost (\$/MWh)</i>	\$84.1	\$82.2	\$67.4	\$68.1

Q. Is the fact that a 2023 retirement results in customer savings sensitive to key inputs?

A. No. While the magnitude of the savings changes depending on the factors outlined above, all of my calculations show substantial savings from 2023 retirement regardless of the chosen assumptions for replacement costs, carbon costs, and fixed O&M costs.

IV. CONCLUSIONS AND RECOMMENDATIONS

Q. What do you conclude from your analysis of Four Corners Units 4 and 5?

A. The Company has continually failed to adequately assess these units' future no matter the underlying market conditions that they face. Since acquiring a larger share of the units in 2013, gas price forecasts have decreased and remain low; and

⁸⁹ See *supra* note 87; Attach. TC-4, Highly Confidential Attachment "SC 2.5_ExcelAPS19RC01226_Fixed Fuel and O&M Costs_HIGHLY CONF" (referred to in APS Response to SC DR 2.5(a)).

1 renewable and storage resources have become low-cost options compared with
2 continued coal operation. The Company also spent hundreds of millions on SCR
3 retrofits, without considering foregoing such spending and retiring the units prior to
4 2031.

5 While I am not recommending disallowances for expenditures before the current
6 test year, APS's conduct at prior decision points establishes a clear pattern of failing
7 to prudently evaluate ongoing operations at Four Corners Units 4 and 5 on the part
8 of APS. Most importantly, the Company has yet to look at retiring the units prior to
9 2031 in the face of mounting evidence that these units are losing APS's customers
10 money.

11 In place of an analysis by APS, I conducted my own forward-looking economic
12 assessment of the units, relying on APS's own projections of the coal units' costs,
13 and I have found that there would be substantial savings from retiring units 4 and 5
14 in 2023 instead of 2031, ranging from hundreds of millions to over one and a half
15 billion dollars. These findings show that the units should be retired as soon as
16 possible. If APS does not decide to retire the units, the Commission should require
17 that the Company evaluate earlier retirement in the 2020 IRP and subsequent IRPs.
18 Accordingly, it is clear that continued investment in and operation of Four Corners
19 Units 4 and 5 beyond 2023 is an imprudent use of resources that should not be
20 carried by ratepayers.

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1 **Q. How do you recommend that APS and the Commission address test year and**
2 **future capital spending at Four Corners Units 4 and 5?**

3 **A.**There may be planned capital spending included in the revenue requirement for this
4 rate case that would have been unnecessary if APS had prudently evaluated retiring
5 the units before 2031.⁹⁰ APS had ample evidence showing that the economics of the
6 units were eroding, well before this rate case. Given the evidence that early
7 retirement of these units would provide substantial savings, a prudent utility would
8 have re-evaluated the long-term operations of the units and modified its planned
9 capital projects accordingly.

10 It would be unfair and unreasonable to require customers to pay for those capital
11 costs that should have been avoided. However, I am not currently in a position to
12 identify particular projects that could have been avoided during the test year or
13 could be avoided moving forward; rather, APS, as the plant operator, is in the best
14 position to do so. Yet, as of this filing, the Company has refused to provide such an
15 evaluation when asked.⁹¹ Notably, APS's 2020 IRP projects a [REDACTED]
16 [REDACTED] when the plant is assumed to retire in 2031; it is
17 therefore likely that a [REDACTED]
18 [REDACTED] if there were a 2023 retirement.⁹² Therefore, the Commission
19 should direct APS to identify such avoidable spending during the test year and

⁹⁰ As noted, for Four Corners 4 and 5 specifically, Exhibit BDL-4DR includes \$10.1 million in "total projected costs"; Exhibit BDL-5DR includes \$58.9 million in "total projected costs."

⁹¹ Attach. TC-2, APS Response to SC DR 7.1.

⁹² Attach. TC-4, Highly Confidential Attachment "Citizen Groups 2.14_ExcelAPS19RC01446_FC CAPEX_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.14).

1 moving forward, and hold this rate proceeding open until such as time as the
2 Commission and other parties are able to review such an evaluation. All avoidable
3 costs should be disallowed from rates.

4 **Q. How do you recommend that APS and the Commission address replacement**
5 **for these units should they retire?**

6 A. The Commission should direct APS to issue an all-source RFP with the intention of
7 fulfilling its energy and capacity needs in the absence of its share in Four Corners
8 Units 4 and 5, for an in-service date of no later than the end of 2023. In order to
9 encourage a robust, competitive sample of bids, the RFP process should involve: 1)
10 ample time for response from bidders—e.g. more than one month; 2) no preference
11 for technology type, size of project, or ownership; and 3) an independent evaluator.
12 Two examples of all-source RFP's that successfully garnered competitive and
13 robust bids were discussed previously in this testimony: Xcel Colorado and PNM.
14 The Commission should open a docket to address this replacement process so that
15 stakeholders can be involved in the development of the RFP, choice of independent
16 evaluator, and selection of replacement resources.

17 Even if the Commission disagrees that Units 4 and 5 should be retired in 2023, then
18 it should still direct the Company to issue an all-source RFP described above to
19 evaluate the units' future. Bids from this RFP could then be modeled to compete
20 with existing APS units, such as Four Corners Units 4 and 5.

21 **Q. Does this conclude your testimony?**

22 A. Yes.